SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

COLLIERIES IN NORTH DURHAM, THEIR WORKINGS AND MACHINERY—No. XV.

HARRATON COLLIERY.—Under this head are now comprised six properties, which were in former times carried on as distinct collieries, their aggregate area being over 3000 acres. The whole of this area is designed to be got—as regards completing the extraction of coal from partially worked seams—and raised at the Fifth pit, the present coal pit. To show the difference in practice at the early period of mining, the number of pits on the several properties are given, at most of which coal has been raised. Lambton Park, perhaps 50 pits in all, but 8 to the Hutton seam, Harraton 6, Fatfield 6, Chatershaugh 4, Rickleton 18, and Leafield 4 pits. These collieries have played so important a part in the early period of coal mining that we are induced to give a few historical notes concerning them.

Coal is supposed to have been worked under the site of Lambton Castle as early as the year 1600 in the upper seams, the Three-quarter, Five-quarter, and Main coal; and subsequently in the Maudlin, Low Main, and Hutton seams. The workings in all these have recently been stowed up with bricks and mortar, at a cost of upwards of 20,000*l.*, both under the Castle and to some distance beyond it, which has had the effect of giving to the building a firm foundation.

Harraton Colliery (proper) in 1644 was the property of Mr. Hedworth, and had been leased, for a mere acknowledgment, to Sir W. Wray, of Beamish, who being a Papist, the colliery was sequestered, when it was valued at 3000*l.* per annum. The colliery was then leased under the State to George Grey, of Southwick, and George Lilburn, but in 1649 it was seized by Sir Arthur Hazelrigge, the Governor of Newcastle.

In 1738 it is stated that pillars were first worked off in fiery mines at Chatershaugh. Prior to this time the proportion of coal left as pillars in fiery mines was about two-thirds. In 1760 the steel mill was introduced by Spedding, which was much used subsequently in the mines under description. After the explosion in the Hall pit, Fatfield, in 1813, the viewer, it is said, "milled" his way into the mine to the seat of the accident. In the same year the plan of "coursing" air through the waste of mines, or, in other words, ventilating the back workings, was introduced in place of "shething" these workings, or more frequently there was an absence of any ventilation or current of air whatever. In 1771 a great flood occurred, which filled with water the mines of North Biddick, Chatershaugh, and Low Lambton, the Tyne bridge at Newcastle being swept away at the same time. In 1815 the method of dividing or "splitting" air currents—first adopted at Felling—was soon after this practised generally at mines in the district.

The explosions recorded as occurring in the Harraton Mines are—

No.	Date.	Colliery.		
1	1708—August 18	Fatfield	69	lives lost.
2	1756—August 11	Chatershaugh	4	,,
3	1757—September 4	Lambton	2	,,
4	1766—August 22	Lambton	6	,,
5	1767—March 27	Fatfield	39	,,
6	1778—December 8	Chatershaugh	24	,,
7	1794—June 9	Rickleton	30	,,
8	1794—June 11	Harraton	28	,,
9	1803—September 25	Lambton	3	,,
10	1808—November 29	Harraton	4	,,
11	1808—November 30	Fatfield, Hall Pit	3	,,
12	1813—September 25	Fatfield, Hall Pit	32	,,
13	1814—September 9	Leafield	4	,,
14	1817—June 30	Harraton, Row Pit	38	,,
15	1817—July 2	Harraton, Fifth Pit	8	,,
16	1825—July 3	Fatfield, Judith Pit	11	,,

That in 1825 is the last of the explosions on record. On Dec. 21, 1832, four lives were lost at Harraton by the breaking of the pit rope. This must not be regarded as a complete list, as no doubt minor explosions are omitted. After the blast, at No. 10 on the list, the coal was found to be on fire; the pit was then closed up, and continued so for two months. When opened the fire was found to be extinguished. One pony was found alive, in good condition, and the others (23) dead. No. 14 accident was caused by the perversity of a hewer in removing the gauze of his lamp so as to obtain more light. His companion left him in consequence, and the explosion took place by the time he arrived at the top of the pit. Eight men in the following accident were suffocated by after-damp (resulting from the same explosion), two days later, in travelling between the Row and Fifth pits. We observe that several accidents in those times are said to have been caused by leaving a door open, showing the folly of allowing the safety of a mine to depend on a door or its attendant. But the small quantity of air introduced into mines in those days was insufficient to dilute the constant emission of gas from the coal. Ensuing from this no doubt one prolific cause of these accidents was the return air being frequently at the firing point and exploding at the furnace; when we add to this carelessness of men, want of proper rules for their guidance, and unskilfulness in the practice of ventilation, some insight is gained as to the mode of occurrence and frequency of these accidents. Though it seems clear that the Fatfield, Chatershaugh, and Harraton mines produced fire-damp largely in past times, the freedom from accident in them from 1825 to the present time must not be attributed to any diminution in gas given out, as some of these mines have continued to work, and are in operation at the present time, and the production of fire-damp is equally great, all coal being now brought to and raised at the Harraton Fifth pit. The blasts that took place in the old mines were many of them very violent. At the explosion which occurred in the Harraton Fifth pit, in 1817, probably near the shaft, a man was blown up the pit, alighting in a pond near the top of it. To an improved system of ventilation must be attributed the advances that have been made, the use of lamps, and the larger quantities of air introduced into the workings. At no distant time we predict that ventilating by machines will be the rule, and a greater measure of safety ensured by this, and a perfected system of ventilation as regards underground arrangements, the prohibition of the use of powder, and the introduction of good safety-lamps.

THE HARRATON FIFTH PIT.—Two pits are sunk to the Hutton seam, 80 fms. in depth, and 40 yards apart. The coal pit is 10½ ft. in diameter, not applied for ventilation. The other pit, 10 ft. in diameter, is a special upcast, and the agent for the ventilation of the whole of this coal field. The downcast is Rickleton pit, specially applied to this purpose. A winding lever-engine erected here has a 36-in. cylinder, 5-ft. stroke, 10-ft. cylindrical drum; this and the fly-wheel are supported on wood framing; the house also of wood. About 700 tons of coal are raised per day from the level of the Hutton and Maudlin seams, with two-decked cages, four 7-cwt. tubs in each cage; one cage and four full tubs weigh 75 cwts. This engine and an underground engine are supplied with steam at 30 lbs. pressure from one Lancashire boiler, 28 ft. by 7 ft., with tubes of 30-in. diameter, and five plain boilers with flush flues; these vary from 31 to 36 ft. in length, and 5 ft. 2 in. to 6 ft. in diameter; each is fired by Juckes' revolving bars. The boiler-feeder is a 10-in. inverted cylinder, 8-in. stroke, and 7-in. ram pump, made by J. and E. Joicey. Nine coal screens are of iron; the heapstead, double-inclined elevator, and other framing are of wood, erected about six years ago.

The HAULING-ENGINE is placed in the Hutton seam, 30 yards south of the coal pit, there being two 8½-ft. turn-wheels at the pit to turn the ropes into the south-west road. The engine has two 26-in. vertical cylinders, 3-ft. stroke; two 5-ft. drums, on separate shafts, placed on elevated walls; the drums are put in motion by one pinion and two spur-wheels, of equal size. One shaft with drum is moved by slide carriages; the other shaft has a drum put in or out of gear by a clutch, and also drives direct a vertical pump at nights. The pump is double-acting, 10-in. plunger, 3-ft. stroke, forcing water through 10-in. mains to the top of the pit. It raises 20 gallons per stroke=400 gallons per minute. The pressure of water due to this depth, 80 fms., is 208 lbs. per inch, but friction augments the resistance greatly. The steam-pipes, 10-in. diameter, are brought down the coal pit to the Main Coal seam, and thence by a staple to the receiver near the engine. The escape steam-pipes, 10-in., are taken to the bottom of the upcast. The engine-road in the Hutton seam proceeds south-west from the pit 810 yards, to a point A, made through old partially worked pillars, which necessitates building a wall at one side of the road to make an air-tight channel. At the point A the Castle-way branches off southward into Lambton-park property. The return wheel at its extremity is 1573 yards from the pit. The main road proceeds from A westward for 700 yards to the point B, where the Leafield-way branches off northward. The return wheel at its extremity is about 2000 yards from the pit. The main line goes 100 yards further west, where the north-way branches off. The return wheel at its extremity is 2167 yards from the pit. The main line proceeds 60 yards further west, where the Pelaw-way branches off southward. The return wheel at its extremity is 2123 yards from the pit. The main line proceeds a little further west, where the Chester-way branches off south-west, the return wheel at the end being 2266 yards from the pit. When the empty set arrives at the point A the tail-rope is changed to run the set either west or south, as required. When the empty arrives at B the tail-ropes are changed for each of the four remaining ways, as required, one rope being allotted to each way. Both main and tail ropes are used throughout this system; 63 tubs are run with each set. The five return wheels are 8 ft. in diameter, and the wheels at branch ends are of similar size. Steel wire-ropes are used, usually lasting 18 months. Near the Leafield branch end a vertical double-acting pump is worked occasionally, with 6-in. plunger, 2½-ft. stroke. This pump is driven by deflecting the tail-rope over two small sheaves and under a 6-ft. wheel; the deflection is about 2 ft., but this can be varied, as the brasses of the sheaves are adjustable, being moved up or down by levers. The pump forces water from the bottom to the top of a staple, thus draining the workings in a trough between two faults. These workings were at one time filled with gas at high pressure and water, but this has been tapped, and let off at a higher point.

UNDERGROUND WORKINGS.—About three-fourths of the coal is brought from the Hutton seam, the remainder from the Maudlin seam. The Maudlin seam at 58 fathoms has 5 ft. of coal, including 3 in. of splint in the middle. The Hutton seam has 5 ft. of good coal, and 6 in. of coarse coal kirved in=5 ft. 6 in., but this is reduced in some parts to 4 ft. 8 in. The unworked or whole coal is got by the bord and pillar method; pillars are made 30 by 10 yards. The cleavage runs north and south. Stephenson lamps are used in pillar working, Davy and Clanny lamps in whole workings; powder is used in the latter. Large areas of pillars exist in the seams above the Maudlin, a great proportion of which will be worked eventually. The Low Main and Brass Hill seams are almost intact. The furnace at the bottom of the upcast is 20 ft. long, 10 ft. wide, fired in front, and in two places at each side. The air in circulation in the whole of the seams—throughout a large area in some of them—is 120,000 cubic feet per minute at 1½-in. water gauge.

BORING FOR TAPPING WATER AND GAS.—When workings were conducted in the unmethodical manner of old times great risk and uncertainty attend the exploratory workings of the present, boring becomes indispensable, special precautions being required. Eight holings have been made during the last eight years into abandoned workings in the Lumley and Harratan properties, which have all been successfully accomplished. The old plans in most cases have been found nearly correct, but as these could not be relied upon a system of boring is always commenced at some distance from where the old works were represented to be. A pair of places are driven usually 3 ft. in width, 4 yards asunder; the back drift is kept 10 yards behind the fore-drift, which saves boring at one side of the back-drift. Five bore-holes precede the driving of the fore-drift, and three in the back-drift. In the fore-drift one front hole and a slope hole on each side are bored 7 yards in advance; also a flank hole at right angles on each side is bored 5 yards in, 2 yards of coal is then taken out, leaving the front holes still 5 yards in advance. The flank and sloping holes are commenced at 2-yard intervals. When the pressure of water or gas is known to be very great the bore-holes to prove the position of the workings are driven 7 yards or more in advance, when boring shall be resumed. The first important boring made was in the Harraton Fifth pit into an area of 40 acres, standing in pillars 20 by 8 yds. in the Hutton seam, which had been shut off for a long period. The workings were on the dip side of a 4-fathom fault; the coal had been drawn up a pair of staples, which had become filled with rubbish for half a century; this made the pressure of the gas to be tapped the more uncertain; through the rubbish there came occasionally bursts of water, and then gas, which would partially abate the internal pressure. In approaching these workings to the rise the places, each 4 ft. wide, were preceded by bore-holes, as described above. One Stephenson lamp only was used in each place, held in the hands of the man who accompanied the borers, and stood at a distance back from the face. About 10,000 cubic feet of air per minute was passing behind the brattice into the face at this time, but provision was made for turning 16,000 cubic feet in if requisite. When one of the slope-holes struck the old workings the gas was found to be of very high pressure, probably 70 lbs. per inch. The hole was with difficulty plugged up, and arrangements were then made for letting it off gradually. At the commencement of the issue of gas from the bore-hole the noise was terrific, and could have been heard at a distance of 400 yards. The issue continued at the hole for three weeks, until it became reduced to atmospheric pressure. Arrangements had been made to convey this gas into the upcast pit, 14 fms. above the furnace drift, which was done without any misadventure, and successfully, considering the great risk of the undertaking. The very high pressure of the gas in such cases can only be explained by its existence at great pressure in the bed of coal, which is given out, and fills the enclosed space of the workings, until in time an equilibrium of pressure is established between the gas in this space and its internal condition in this, or some adjacent bed of coal.

Another important holing was made in the Hutton seam, from Bedlamer Hole to the Nursery pit workings. The boring was managed in a similar manner to the former, with five bore-holes; but these were kept 2 yards more in advance, or 7 yards always before the face in front, and against a pressure of 47 fms. of water, equal to 122 lbs. per inch. These pits are near the Lamb Bridge, in Lambton Park. The water ran off for three months at the bore-hole, gradually decreasing in pressure. There were occasional bursts of gas from the hole, which continued a few hours each time.

The PUMPING-ENGINE at the HARRATON ROW PIT is one of the original Newcomen's atmospheric engines; it has been in operation here many years, and is still doing considerable duty. The cylinder is open-topped, 33-in. diameter, 4-ft. stroke, condensing below the piston. One plain cylindrical boiler, 25 ft. by 7 ft., supplies steam at 1½ lbs. pressure; formerly a haystack boiler was used. The beam is of oak, with arched ends and connecting chains. Balance-weight at top of pit. Back beam of wood, from which is worked jack-head pump from pond, to condense steam. The engine raises water from the Hutton to Main coal seam, in one lift of 38 fms., 10-in. bucket, 4-ft. stroke, making 14 strokes per minute day and night. At 10 gallons per stroke it equals 140 gallons per minute. A portable engine at this pit is moved where required; it has 9-in. cylinder, 4½-ft. drum, and Cornish boiler.

The CHATERSHAUGH PUMPING BEAM-ENGINE has 38-in. cylinder, 6-ft. stroke; it raises water in two lifts from the Hutton seam, depth 77 fms.; lower lift, 38½ fms., in the pit up to main coal; upper lift, 38½ fms. to surface, in a staple inside of cylinder; 14-in. buckets, 4½ ft. stroke in each case; 29 gallons are raised per stroke. The engine makes 9 strokes day and night, equal 261 gallons per minute. Steam is supplied from three plain boilers, at 25 lbs. pressure. A winding lever engine erected here has a 24-in. cylinder, 5-ft. stroke, two 7-ft. drums, not used at present.

The GASWORKS erected near Harraton pit supply the colliery and Lambton Castle, the latter by 1½ mile of pipes. The works comprise eighteen fire-clay retorts, two coke scrubbers with water-passing, six dry lime purifiers, two gasholders, each 20 ft. in diameter, 12 ft. in depth; one holder is pressed at 5 in. of water to force gas down the pit; the other, for the Castle, is pressed at 1½ in. Another holder, 26 ft. by 12 ft. is placed near the Castle. The number of gas-lights at Lambton Castle is 1193, and at the pit and in the mine 226=1419.

BIRMINGHAM AND THE BLACK COUNTRY—No. XI.

THE WORKS OF MESSRS. THORNEYCROFT AND CO.

The firm of Messrs. Thorneycroft and Co. consists of several gentlemen (including Major Thorneycroft) of high standing, both commercially and as manufacturers, in connection with the iron trade. Mr. Hartley, who is well known to be one of the greatest authorities upon iron producing, is one of the members of this firm. The works of the company are the Shrubbery and Swan Garden Ironworks, Wolverhampton, and the Bradeley Colliery and Furnaces, near Bilston. We shall first notice the Bradeley Furnaces. There are two circular brick blast-furnaces, 47 ft. high by 13 ft. diameter across the boshes. They are bound round with wrought-iron hoops, and supported upon arched circular bottoms. Each furnace is furnished with six tuyeres—those at No. 1 are of iron, and those at No. 2 of brass. The blast is supplied by a powerful condensing beam-engine, having a steam-cylinder 52 in. diameter, and a blowing-tub 96 in. diameter; the stroke is 8 ft. The engine is fitted with ordinary bell valves; and the steam, which is worked at a pressure of 28 lbs. to the square inch, is cut off at half the stroke. The engine-beam is extended at the steam-cylinder end, and connected by means of a rod and crank to a 24-ton fly-wheel. The steam is produced by five cylindrical egg-ended boilers, 50 ft. long by 6 ft. 6 in. in diameter. The boilers are enclosed in a house, and the safety-valves are carried through the roof at the top, so that when they are blowing off the boiler-house is not filled with steam.

The blast engine-house is a massive rectangular brick building, having on its top a large wrought-iron tank, into which the water is pumped by the engine, and from whence it flows to the tuyeres, &c. The blast is supplied at a pressure of 3½ lbs. to the square inch, and is conveyed to the ovens through a wrought-iron main 6 ft. in diameter. Two small ovens, having 24 5-in. pipes each, and one large round oven having 10 12-in. pipes, heat the blast for No. 1 furnace; and a large oven containing 40 9-in. 3½-in. syphon-pipes answers the same purpose for No. 2 furnace. A large oval oven, to contain 18 12-in. pipes, is in course of erection, to be used at any time when that belonging to No. 2 shall be out of repair.

The material used in the furnaces is drawn to the top, up an incline, by a small horizontal engine, standing near the foot of the incline. A flat rivet-chain, working over pullies, is used to connect the wagon with the engine. This engine derives its steam from two small cylindrical boilers. The molten iron is not here run in the usual way into sand pig beds, but into what are termed tiger-moulds. These are strong cast-iron moulds, weighing about 2 tons 6 cwts. each, and containing six apertures or beds, into which the iron is run. Each piece of iron, when it is cooled, is called a tiger, and weighs about 1 cwt. These tiger-moulds have been put down at a cost of 1200*l.* Their use is far from being economical, as they make a large quantity of light scrap, which has to be used to great

waste in the refinery, and yet it is said that the advantage gained in this instance more than compensates for this loss, as the iron is very pure, and free from sand.

We should suppose that this iron is only used as a mixture, as the silicon or sand is, to some extent, a necessary ingredient in the puddling-furnace. The whole of the iron produced here, and much larger quantities of bought pig, are used in the company's finished ironworks. The casting houses in front of the furnaces are covered by corrugated iron roofs. The cinder at the present time is run in the ordinary way into holes round cinder stakes, and has to be lifted on to a trolley to be taken away, but it is intended to have cast frames for the cinder, so that it can be run straight on to the trolley, in the same manner as it is done at the Corngreaves Furnaces, which was described by us. The waste gas is utilised at these furnaces, and is taken off below the surface of the material at the furnace mouth, through fire-brick openings leading into a brick flue, which surrounds the furnace.

No means are provided on the outside of the furnace for cleaning out this, but it is done through openings covered by plates in the landing platform at the tunnel head. This is not the best plan that could be adopted, for it makes it awkward to clean the flue out, and should the opening into the furnace become clogged up they have to be probed with bars from the top of the furnace on the inside, and this damages the brickwork. The gas is carried from the furnace-tops down through brick flues, used instead of wrought-iron lined with brick, but they do not answer hardly so well, as they allow the ingress of air to the gas, thus creating combustion; this is partially obviated by occasionally whitewashing the outside. The gas from No. 1 furnace is carried through an underground flue to the blast engine boilers.

A wrought-iron 6 feet diameter flue runs along the front of the boilers, into this the gas passes, and is delivered through elbow-flues under each boiler. The ordinary stack or chimney is used. The gas from No. 2 furnace heats the whole of the hot-air ovens, and is drawn off by a moderate-sized stack built for the purpose. There are two wrought-iron cased kilns, in which part of the ironstone is calcined; these do not work so satisfactorily as they might, for they are not sufficiently high. Many of the castings required for the ironworks are made here, and there is a small cupola for melting the iron. There is also a small refinery for purifying a portion of the iron. Blacksmiths' and carpenters' shops, in which the necessary work is done, adjoin the furnaces. The ores from which the iron at these furnaces is produced are the North of England, North Staffordshire, and Northamptonshire hematites, and the native argillaceous ironstone. The yield of each furnace is 182 tons per week. The principal native ore used is the blue flats, one of the most productive in South Staffordshire, of which the following is the analysis, as given by Dr. Percy:—

Protoxide of iron	42·34	Carbonic acid	30·91
Sesquioxide of iron	1·47	Phosphoric acid	0·25
Protoxide of manganese	1·12	Sulphuric acid	Trace
Alumina	0·59	Bisulphide of iron	0·06
Lime	3·89	Water { Hygroscopic	0·28
Magnesia	1·48	Water { Combined	0·73
Potash	—	Organic matter	0·56
Silica	0·35	Ignite—insoluble residue	15·50
Total			99·53

IGNITED—INSOLUBLE RESIDUE.

Silica	10·82	Lime	Traces
Alumina	3·65	Magnesia	Traces
Sesquioxide of iron	0·11	Potash	0·84
Total			15·42
Iron—total amount			34·41

We purpose shortly giving a description of the extensive ironworks belonging to Messrs. Thorneycroft and Co.

IRON AND STEEL INSTITUTE.

In the discussion which followed the reading of Mr. Walker's paper "On Modern Appliances for Reversing Rolling-Mills" some valuable observations concerning rolling generally were made.

Sir JOHN ALLEYNE stated that he was using two engines, one running each way, each engine being provided with a wheel and pinion. He considered Mr. Walker and others thought more than was necessary about reversing gear. They had, in their case, 400 tons to move, and had worked for a year without breakage. He was about to adopt the differential fricton-clutch patented by Mr. Napier, of Glasgow, and he believed from what he had seen of it that it would work well. The invention consisted essentially in the use of a differential lever, instead of Mr. Walker's hydraulic clutch.

Mr. MENELAUS thought nothing of greater importance than the question of reversing rolls at great speed. He had seen Napier's clutch, and was well satisfied with it; if it proved successful in practical working it would be the greatest stride yet made in connection with rolling iron and steel.

Mr. BLAYDON (of Blochairn) considered Mr. Walker's plan very successful. He had a mill with three pairs of rolls, which he had run at 45 revolutions—only the previous night he had himself rolled one plate, 21 ft. by 5 ft. and ⅜ thick, and another plate that was irregularly heated was stopped when half through. The brake was put on very suddenly, but the engine was brought to a dead stand, the brakes taken off, the engine reversed and started again at half-speed; the brake was then put on gradually, and though the plate was 7 ft. 6 in. wide it came through beautifully—as though there had been no stoppage. He considered Mr. Walker's system of great importance from the facility it possessed for stopping the plate. He thought that if they did away with the fly-wheel they made a permanent charge on the works.

Mr. J. HEAD never looked upon reversing-mills without feeling that they were very clumsly contrivances. He had heard of the clutches being thrown in and out of gear a mile distant, and could not think that that could happen without injuring the machinery.

Mr. BLAYDON said that in their mills, though there were three heavy pairs of rolls, a person might stand at 10 ft. distance with his back to the rolls, and would not know when they were thrown in and out of gear.

The PRESIDENT thought nothing could be more satisfactory than the way in which the hydraulic clutches of Mr. Walker worked, and he was sure all would appreciate the way he had brought the matter before them.

Mr. OLRICK described Bischoff's Metallometer, which has already been described in the *Mining Journal*. It consists of a vice for fixing the test-strips of metal, and a guide through which the strips pass. The guide is capable of turning upon two axles which rest in bearings, fixed to the vice. Weights keep the guide in a vertical position below the vice if the vice be moved by the movement on the axle to which it is fixed, and which rests on bearings in suitable standards. Thus, the guide forms an angle with the vice at each to-and-fro movement, and a test-strip, which is held suspended from the vice, and passes through the guide, will also, after the apparatus is set in motion, be bent alternately to the right and left, by preference to an angle of 67½°, until it breaks, whereupon the part severed is caused to fall off, by means of a small weight attached to it. The metallometer is actuated preferably by clockwork, and the clockwork or mechanism which actuates the apparatus has two dial-plates, with pointers, which mark the number of to-and-fro movements the sample has withstood before breaking off—this number he terms the test-mark. For testing the particular strips the several apparatus appear to be very simple and ingenious, nothing being required to enable an approximate conclusion being arrived at as to the character of the plate or ingot tested but a careful estimate of the change which the metal undergoes by the additional manipulation it receives in the test-rolling machine employed to obtain the test-strip. The tables in which Mr. Bischoff has recorded his experiments show some curious results—thus, 3 per cent. of lead as an impurity in zinc gives the same test-mark as zinc contaminated with one 100,000th of 1 per cent. of tin, and there are equally curious points in connection with other alloys. In testing the qualities of metals or alloys, Mr. Bischoff distinguishes between such as do not materially alter in quality through fusion—zinc, tin, &c; and such as do alter in quality—copper, brass, &c. The former he casts into ingots, 120 mm. × 13 mm. × 3 mm. (about 4¾ in. long, ½ in. wide, and ⅛ in. thick, which are rolled at the ordinary temperature into test-slips, 130 mm. long, and 7 mm. wide, weighing for zinc and tin 1500 milligrammes and for lead 2500 milligrammes. These test-strips are then annealed, and, finally, each is cut into two lengths, 65 mm. long, when they are ready for testing in the metallometer. In the case of copper, brass, or other metals or alloys which alter in quality through fusion, one must again distinguish whether plates or ingots are to be tested; from plates strips are taken in the direction in which the plate has passed through the rolls—from ingots the strip is sawed or chiselled out. They are rolled down, as in the case of zinc, and cut into similar-sized test-strips. The annealing must also be effected under the same conditions if different samples of the same metals or alloy are to be compared.

Mr. BALL called the attention of the members to Burleigh's rock-drill, and invited the members to inspect it in operation at Deptford. The merits of this drill are already known to the readers of the *Mining Journal*. The hardest granite is readily drilled with a 2 in. or larger hole at the rate of 11 in. to 12 in. per minute, and the machine is as portable as could be desired, and as easily handled as a small steam-hammer.

The first paper read on Thursday morning was by Mr. WM. FERRIE, "On a Covered Self-Coking Blast-Furnace." The fuel is charged in the raw state under an ordinary bell and cone. The height of the furnace is 83 ft.; diameter at bosh, 18 ft.; and the diameter at top, 12½ feet. The upper part of the furnace below the bell and cone (from the top about 20 ft. downward) is divided into four compartments by vertical walls supported on arches and radiating from the centre. These vertical walls and the circumferential walls are pierced with flues, through which a portion of the gases taken from the top are let as far down the furnaces interiorily as the bottom of the retorts. The gas so conducted, after being mixed with the necessary quantity of atmospheric air, which is admitted by means of gratings placed round the upper stem of the furnace, is ignited, and passes up through and round the flues, and is assisted in its passage by stalks attached to the top of the furnace. The brickwork on each side of the vertical walls is 9 in. thick, and that between the inside of the retorts and flues in the circumferential walls is also 9 in. The temperature in all the flues will range from 1500° to 1700° Fahr. The heat in the brickwork forming the flues is a bright red, which, passing through the 9 in. walls, and combining with the ascending heat from the lower part of the furnace, completely cokes the coal in its passage down the four retorts or compartments, and, at the same time and in the same way, it raises the temperature of the ores and flux to the same degree. A hole was drilled through the wall of the furnace at the Monkland Works, on a level with the spring on the arches on which the retorts partially rest, and the burden, as seen through the opening, was red hot, and the temperature, according to Siemens' pyrometer, 6 in. inside the lining, was at one reading 1434°, and at another 1554°. The gases passing out of this opening were of a pale colour, indicating that the fuel at that zone had parted with its principal gaseous components, and was in a state of coke. The results have been most satisfactory, in regard not only to the saving of coal and ores, but in regard to the superior quality of iron produced. In the Lanarkshire district, the quantity of coal required in the manufacture of a ton of No. 1 pig-iron ranges from 50 to 52 cwts. in the furnace, whereas in this new furnace a ton of the same quality can be produced with from 32 to 36 cwts. In ores the saving will be about 2½ cwts. per ton of iron. In the working of this furnace there is no hanging of the materials, no running of burden, nor any annoyance with the tuyeres. The regularity of action is accounted for, in a great measure, by the mode in which the interior of the furnace is constructed. In an ordinary furnace, the materials charged frequently occupy very irregular relative positions to each other, but in this furnace such irregularities are obviated. The utilisation of the gases withdrawn from the furnace is as perfect as that attained at Middlesborough and elsewhere, and, in point of quantity, if not in quality, greater in excess than that obtained from any other covered furnace. The gas produced is estimated as double the quantity required for heating blast and raising steam at blast-engine boilers.

Mr. MENELAUS said the writer was in error in supposing that gas was not taken off from coal-burning furnaces. They had been taking the gases off for 14 years, and using them in the manner now proposed. Many of their furnaces were working on raw coal, and they made every quality of metal, from common forge pig to No. 1 Bessemer.

Mr. WILLIAMS considered much of the saving of fuel was due to the increased height of the furnace. That saving was very nearly the same as that which was got at Middlesborough by simply raising the furnace—about 30 per cent. No doubt there would be coking of the coal, but the same effect would be produced if the walls were not there, for the interval walls only got their heat out of that which was produced in the interior of the furnace. One point altogether puzzled him, and that was the saving of 2½ cwts. of iron ore. No one could take out of the ore iron that was not it, and if there was a saving of 2½ cwts. by the new process an equivalent quantity of iron must have been lost before, but he did not think there could have been any such waste before. He was convinced that it would turn out that, somehow or other, a mistake had been made with regard to the 2½ cwts. The company with which he was connected had seven blast-furnaces that never made anything else but forge-pig, and they worked as steadily as could be desired. There was no difficulty in keeping furnaces at forge-pigs year after year. Some time ago he made an experiment on one of their tall furnaces with raw coal. Their own coal was not sufficiently strong, therefore coal was brought from Staveley, and the experiments succeeded. The furnace used rather more coal than it did coke, still the quantity of coal was small, and the furnaces worked well, with this exception, that they were overwhelmed with gas. Their arrangements were made for taking away the gas produced by Durham coke, and when they put in the Staveley coal there was such an enormous excess of gas that that of itself would have forced them to stop the experiments. They were obliged to let it wherever they could make an opening, and, after all, they had an enormous back pressure, which they could not get rid of.

Mr. BELL was quite convinced that the data submitted were entirely to be relied upon. As to Mr. Williams's remark, that the excess of gas had proved inconvenient, he had no doubt that if Mr. Williams had found it desirable to bring up the Staveley coal that was a difficulty which he would have well known how to grapple with. There could be no doubt that Mr. Ferrie was the first man in Scotland who had shown the Scotch ironmasters how to use a tall furnace, so that they might be able to manufacture a ton of iron for something like a ton of coal less than they used to do. Whatever might be Mr. Ferrie's legal claims upon the ironmasters of Scotland, at all events he, and those who had been acting with him, were entitled to far more than a bare expression of gratitude; and whether the advantage was due to the height alone, or to the height added to some other improvement, it was to be hoped that the ironmasters of Scotland would not allow their gratitude to expend itself in words. Mr. Ferrie was entitled to some handsome recognition on the part of those who, undoubtedly, would largely profit by that which he had done. He himself attributed a great deal more of the advantage to the increased height of the furnace than to the coking apparatus. The Scotch coal contained about 65 per cent. of coke, so that a furnace using (say) 50 cwts. of raw coal would really be consuming something like from 31 cwts. to 32 cwts. of coke; and in the Middlesborough furnaces of a moderate size, before the blasts were heated to the extent to which they have been more recently, that was precisely the consumption of coke. Of course, when they were making forge-iron they used less, but when aiming at a quality of iron such as that which is always aimed at in the Scotch furnaces, something like from 30 cwts. to 32 cwts. might be taken as the exact equivalent of coal. Mr. Ferrie placed an additional 30 ft. on his blast-furnace, raising it from 52 ft. to 82 ft.; in Cleveland the furnace was raised from 48 ft. to 80 ft. At Monkland, Mr. Ferrie had reduced the consumption of his coal to 35 cwts.; at 65 per cent., the equivalent of that in coke was 22·72 cwts. to the ton; the coke, in point of fact, was precisely that which was used in the Cleveland district. When he went to examine Mr. Ferrie's furnace, he was most anxious to ascertain to what extent the advantage was really due to the combustion of gas in the flues, and, so far as he could learn from a cursory inspection, the views expressed by Mr. Williams were confirmed, and he was certainly inclined to think that the amount of gas in the flues was insufficient to exercise a very notable influence on the work of the furnace. That hydrocarbons did not exist to any great extent was proved—first, by the fact that the materials were entirely incandescent at red heat; and, secondly, by the colour of the flame. Therefore, by the time the fuel arrived opposite the hole undoubtedly all the hydrocarbons were gone, and the fuel doing the work, in point of fact, was coke; but this was no more than would be found in every furnace at the same distance from the top—at 15 or 20 ft. from the charging place.

Mr. PARRY always considered when a furnace worked white forge pig it was to a certain extent out of order. Frequently they found too much iron in the slag, but in such cases they at once sought a remedy, and had always succeeded.

Mr. PLUMB concurred with the opinion that much of the increased yield was attributable to the height of the furnace, but the difficulty had hitherto been that many cokes would not bear a heavy burden, and that, consequently, tall furnaces could not be used. He thought the benefit which Mr. Ferrie had conferred upon ironmasters was to show those in districts having a very tender material to work how they could have their furnaces as high as those at Middlesborough. In Staffordshire the great difficulty was that the coke would not bear a very heavy burden. The chambers in Mr. Ferrie's plan would seem to get over that difficulty, and prevent so heavy a weight being thrown upon the tender cokes. Even if the results to be obtained from the furnace were not altogether what the inventor calculated upon, in regard to the saving of fuel, still he had done a great service to those parts of the country where they had tender cokes only, for his invention did much to relieve the weight.

Mr. BELL acknowledged that the remarks of Mr. Plumb might account for the non-success that had attended the introduction of tall furnaces previously in Scotland, and the good results obtained with Mr. Ferrie's furnace.

Mr. FERRIE had to apologise to Mr. Menelaus for not having know that they had used raw coal in their blast-furnaces. He did not agree with Mr. Williams that the larger proportion of advantage was due to the increased height—in fact, the contrary had been proved by experience.

The PRESIDENT remarked that although the facts given by Mr. Ferrie were to some extent anomalous, they were so well attested that they could not doubt them. Probably one solution might be found in the observations of Mr. Plumb—the additional friction in the tubes might prevent the pressure on the fuel.

Mr. EDWARD WILLIAMS asked permission of the meeting to bring before the Institute the Sherman process of purifying iron and steel. As the subject has been referred to in the President's address, it was essential that they should know the facts concerning it, for such a subject should not be permitted to pass over with mere mention. He had not tried the process, but would like to know the opinions of those who had done so. He did not see Mr. Bragg in the room, but there was no doubt some one present who had seen the process tried.

Mr. MENELAUS had a very simple story to tell. Many months ago he was asked to report upon Mr. Sherman's process. He asked for information, and was told the process was a secret process. He then sent Mr. Snelus to Sheffield, where the experiments were being conducted, with instructions to watch the operations, and bring back samples of the results. Mr. Snelus went, and saw a series of fair and reliable experiments. Material was put into the pots, some of which were physicked, and others treated in the ordinary way, and Mr. Snelus brought back samples, and made an elaborate analysis of them, and the result was that there was no appreciable difference between the steel treated by the Sherman process and that dealt with in the ordinary way. He, of course, wrote to his friend in London, and reported that, as far as his knowledge went, there was nothing in the invention. He said any further experiments were useless, but Mr. Sherman replied that he did not care about the chemical results, but he would satisfactorily prove that mechanically there was a very great improvement in the steel which had been subjected to his process. Mr. Snelus was afterwards sent to Chatham, where experiments were being made by the Government officials upon other samples of the steel, and the result entirely confirmed the chemical analysis. Mr. Sherman some time after went into South Wales, and Mr. Crawshay came to the conclusion there was something in it. He (Mr. Menelaus), therefore, went down to Crawshay's, and arranged to test two similar heats. Pigs were broken, so that half of each pig should be in each heat. They treated one heat without the process and one with, and two bundles of the finished iron were sent up to Dowlais. Mr. Snelus made careful analyses, and the results were the same. There was a shade of difference in favour of the physicked iron, but it was only such as might be expected to result from accident; that was such difference as was found in two heats worked in the same manner. As far as he was a judge of iron, there was no appreciable difference.

Mr. W. R. I. HOPKINS was sorry to have to speak in disparagement of any inventor, but as far as his experience went he was obliged to endorse what Mr. Menelaus had said. Mr. Sherman had visited the Cleveland district, and a great number of the ironmasters of the district met him. He selected four furnaces, and pretended that his process would produce a fibrous puddle bar and a fibrous rolled bar afterwards, no matter what description of pig-iron was used. The results of the experiments, however, was that the bars that were expected to be brittle were brittle, while those that were expected to be tough were tough, and in no case did the use or non-use of the process make any difference whatever. Mr. Sherman himself was quite astonished at his want of success.

Mr. BELL admitted that it was unwise to condemn anything because you could not understand it, but denied that one ought to abandon the right use of his reason to the extent of supposing for an instant that it was possible to perform what Mr. Sherman claimed to perform. He could not believe that a substance that would lie on a five-shilling piece, when added to 5 cwts. of iron, would produce any great effect. He knew that there were 63 simple elements, but he had defied Mr. Sherman to put his finger upon any one of those simple substances, or any of the secondary or ternary compounds which could by any chance produce the results he promised to effect. He said, "That may be very true, but possibly the beneficial effect upon the iron is owing to a greater heat being produced in the puddling furnace." This, however, was equally improbable, and he, therefore, asked Mr. Sherman to tell him of any substance a quantity of which equal to that which he proposed to use would raise the temperature of 5 cwts. of iron. Now there was a certain amount of prestige attaching to the mere mention of an invention in the President's address, so that although their President had cautiously abstained from pronouncing an opinion one way or the other, he thought it essential that the merits of any invention mentioned should be at once ascertained. The Institute should, in his opinion, be a kind of filter through which every proposition intended for the iron trade should be made to pass; he, therefore, thought they ought to thank Mr. Williams for having brought the matter before them. It was an act of kindness, too, to inventors themselves to show them that they are in error when they really are so.

Mr. C. W. SIEMENS had great doubts of the value of the Sherman process when he first heard that one ounce of one substance was to drive out the impurities from several hundredweights of iron. Yet he had tried it at Landore, both in the puddling and in the steel furnace, and found it to produce no effect whatever. He had tried, moreover, large quantities of the substance instead of the small quantities Mr. Sherman proposed, and still the result was the same—no appreciable result.

The PRESIDENT felt personally much indebted to Mr. Williams for having afforded him an opportunity of making an explanation, which had evidently become necessary. The accounts which had reached him of the process had come from friends of Mr. Sherman, and, consequently, had a very bright glow about them. He had not heard one word about the trials which had just been alluded to, and, therefore, when he was told such and such results had been obtained, and that parties were going to take licenses, and make thousands and thousands of tons of pure iron out of the very worst material in the country, he did not feel in a position to ignore such apparent facts, although he could not understand how it was possible that such an effect could be produced. He felt that as an inventor he was bound to bring the invention under the notice of the Institute, to avoid the idea that he had any personal feeling in the matter. Up to that time the Institute had been, as Mr. Bell observed, a kind of filter, and a filter more perfect than was formed by the intelligence of the members was, he thought, not likely to be found.

Mr. RALPH TATE then read a paper "On the Iron Ores of Antrim," in which it was stated that the mines are found in the two extremes

of the geological formations found in the county—the basalt above, and the Carboniferous limestones below. The intermediate strata are the Upper Chalk, the Greensand, the Lower Lias, the rhœtic and the Keuper marls, and a feeble development of coal measures. The Carboniferous rocks occupy but a small patch near Ballycastle, on the north, and yield inferior qualities of coal and ironstone. All the basaltic rocks contain some proportion of iron in their essential composition, averaging 5 or 6 per cent. of the metal. Sometimes small veins and disseminated crystals of magnetite occur, and ferruginous clays, as yellow ochres, are not unfrequent. Chalybeate springs are also found. The railway cutting at Ballypalidy, near Temple Patrick, exposed an extensive ochreous mass, the working of which was commenced by Dr. Ritchie, of Belfast, in 1861. The percentage of iron is small, and would not repay working if it were not for the facilities of transit to Belfast which the railroad affords, and the low freight from that port. The ore, however, is valuable as a flux, and as affording some protection to the inner casing of the blast-furnace, and it has been shipped to Glasgow for this purpose. Five years ago a cargo of ore from a rich deposit, interstratified among the basalts on the flanks of the Slievanance Mountain, was sent to England, and since that time numerous mines have been opened in the eastern section of the county, until the export of the ore has increased to 60,000 tons a year. In the Giant's Causeway the iron ore does not seem to be of much promise, but in its neighbourhood Sir E. Macnaghtan has found it on his property at Ardihannan and Feigh Mountain, the ore from the former locality yielding 49 per cent., and from the latter 47·5 per cent. of metallic iron. About Carnlough and Genarm, the average percentage of metallic iron falls as low as 31, but at Carrickfergus, and near Belfast, the ore appears to be richer. The chief mining operations are carried on along the eastern escarpment of the basaltic plateau, commencing at its north-eastern extremity. Several workings occur between Red Bay and Gurron Point, all of which yield ore of superior richness. Though the basaltic strata usually dip to the west, and, therefore, into the hill range, yet, by faults which traverse the district in generally a north and south direction, the iron series has been thrown up to considerable elevations above the sea-level, and appear cropping out around the conical masses forming the more elevated ground of the central part of the country. At Slievaneigh the pisolite is situated 1095 feet above the sea-level, and beyond the ordinary level of cultivation. The chief drawbacks to the gigantic development of this industry are the cost of surface transit, the difficulty of harbourage, and the royalty charges.

Mr. David Forbes, in a paper "On the Central Iron Districts of Sweden," stated that a large proportion of the total produce of the best Swedish brands of charcoal pig and bar iron is derived from the ores found in the most central parts of the country, particularly the provinces to the north and north-east of the great lake Venern. Owing, however, to the increasing scarcity of charcoal, the production may be said to have already attained its maximum development, so that the practically inexhaustible supply of iron ores in that district must for the greater part remain idle, so far as home manufacture is concerned. The introduction of railways into Sweden, and the completion of the main Government line which traverses the country from east to west, as well as of several branch lines, either already open or now in course of construction into the mineral districts, will put these immense deposits of iron ores into direct railway communication with the other parts of the world—with the Baltic, at the ports of Stockholm and Gefle, and with the North Sea at Gothenberg and Kronkau. A line of railway is now proposed to run from Kronkau to Fahlun, which will cut through the principal iron-producing parts of Sweden, and be the most direct and advantageous means of communication between them and Western Europe. The Central Road, now in process of construction, will bring the deposits of iron between the towns of Fahlun and Frore into communication with the main Swedish lines of road, so as to enable the ores to be exported to other countries at rates which appear likely to secure a ready sale for them in England, Belgium, and Germany. The iron ores occur as veins, very contracted in parts, but at intervals swelling out into great lenticular masses of nearly pure oxide of iron. The width of the lodes varies from a few feet to many yards. The ores are invariably either the magnetic or the specular oxides of iron, or a mixture of both these in the same lode. When quite free from rock, as often is the case in many parts of the lodes, these ores contain from 70 to 72 per cent. metallic iron, and are nearly chemically pure oxides of iron. On the large scale, however, the ores may be said to contain from 40 to 48 per cent. of iron. Analyses of the ore found in the district show that in the majority of cases the deleterious elements, sulphur and phosphorus, are either entirely absent or are present in the minimum proportions known in the very finest iron ores. The total production of iron ores from these mines in the year 1863 was only 106,548 English tons, but the proprietors look upon the mines merely as so many quarries, from which they can always break out as much ore in a few days or weeks as they can smelt down in the entire year, and the quantity actually extracted annually represents, therefore, only so much as can be smelted by the quantity of charcoal which the forests can yield. If the mines were worked continually during the whole year with proper appliances the getting of the ore would not cost more than 4s. The railway accommodation and freight to Gothenberg would not exceed 10s. 8d., making 14s. 8d. delivered in Gothenberg. The freight thence to England would be from 4s. to 8s., so that it would be delivered in England for 1*l.* or 1*l.* 1s. per ton. He thought it important that the attention of iron-masters should be directed to such a supply.

Mr. C. F. Sandberg confirmed what Mr. Forbes had said, and thought arrangements might be made for carrying back coals as a return freight.

The President thought they were much indebted to Mr. Forbes for his paper. They all knew that there was a period when England produced only 70,000 tons per annum, and Sweden was at that time supplying all the iron consumed in this country, with the exception of this small quantity; and it was not improbable that we might again be sent across to Sweden, not for bar-iron, but for the best iron ore. Mr. Sandberg had just handed in a paper, which was sure to contain information that would interest them; it would be printed in the Journal of the Institute. He congratulated them upon the many papers they had heard calculated to develope the usefulness of the institution, and asked them to give the best thanks of the Institute to the various authors of them.

Thanks having been voted to the President, and duly acknowledged, the meeting separated.

COLLIERY EXPLOSIONS.

Sir,—The late colliery explosions have naturally attracted much attention, and especially the case of the Pentre Colliery, which appears from the published reports to have been the most awful on record, not certainly looking at the number of lives lost, but from the circumstance that it was, it appears, a general explosion, the main return air current having exploded at the furnace. The bodies of the men proved that the explosion had traversed the workings, or nearly so, as the men in the pit, scattered as they were over the workings, were nearly all severely burnt. The blast also ascended both shafts, and much injury was caused at the top, the tubs at the top of the upcast being completely shattered, and the erections at the top of the downcast being much injured, while the shock was felt like an earthquake extending over a large area.

The arrangements for drawing the coals are, of course, clumsy and bad, and the downcast pit too small, but those defects do not account for the violence of the explosion. If we are to believe that about 48,000 cubic feet of air per minute passed over the two furnaces, and this from the evidence we must believe, it is very difficult indeed to credit the hypothesis that the current was ignited at the furnace. If this was so, it must be attributed to the fact that the main current of air appears to have been carried *round the whole of the working faces*, a most dangerous and erroneous system. At any rate, in the account given of the ventilation by one of the proprietors, this appears to have been the system pursued, and it will, we think, be held by most practical miners that where the air currents are split judiciously it is not possible to explode the main current at the furnace. Of course, we have only the published accounts to guide us, but this case appears to be so peculiar as to merit serious attention, only with the view of eliciting information which may possibly be useful in the future. We hope that some of your correspondents in South Wales will favour us with their views on this important subject.

I consider the Pentre case one of the most remarkable on record; and, looking at the quantity of air in circulation, it is hardly possible that the explosion could have occurred at the furnace, unless—1. There was some fault in the distribution of the air; 2, or a large feeder of gas was laid bare at a very short distance from the furnace. The explosion might then occur at the furnace, without supposing that the whole return air current was found throughout its entire length.

Newcastle, March 30. M. E.

COLLIERY ACCIDENTS—COAL-CUTTING MACHINERY.

Sir,—Referring to the article in last week's Journal on the colliery explosions in South Wales and North Staffordshire, and wherein is strongly recommended coal-cutting machinery worked by compressed air as being an important ventilating power, which no doubt does to a certain extent assist to ventilate that part of the mine in the immediate neighbourhood where the machine is at work; and for proof reference is made to the West Ardsley Colliery—"That this is done is sufficiently proved by the fact that there has not been a single explosion at West Ardsley since the machine has been in use, although there were many minor ones before it was introduced."

I do not wish to say a word against the capability of the machine, or the ventilating properties set forth, but in justice to my own reputation I think it is only fair to state that I had the charge of the sinking operation of the first four shafts at the commencement of the West Ardsley Colliery, and also the underground management and laying out of the works when the coal was won, till the introduction, and for some time after, of the machine for cutting coal worked by compressed air, and which machine, as well as the air-compressing machinery, which is exactly the same both in effect and principle as that described in the Supplement to the *Mining Journal* of March 18, as adopted by Mr. P. Cooper, at the Holmes Colliery, was arranged by the late Mr. Ridley and myself; and during the time of my superintendence, which was nearly seven years, and ended at the latter end of 1862, there *never was one man or boy burnt by explosion of gas*, or life lost by any other cause; and I only remember *one* slight explosion during that time, although much gas was given off in the opening out of the works. I do remember a man named John Evans getting rather severely burnt by an explosion of gas in one of the banks, where the machines worked in February, 1863, a short time after my leaving the West Ardsley Colliery, but what has been done since I do not pretend to know. J. Rothery.

Waterloo Main Colliery, April 4.

RATING, TAXING, LEVYING.

Sir,—Whatever name we may call that process which compels the owners or occupiers of property or income to contribute towards the maintenance of our national or local institutions, it must be considered as one of the evils necessary to maintain our position as a great nation; and some argue that so long as the taxes are found to bear with equal pressure on all, according to the wealth of each, that there can be but little if any cause for complaining. "What is good for each is good for all."

During last year a very unpretending writer, like myself, sent a letter to the Journal on the Rating of Coal Mines to the Poor, which led to the subject being laid bare and the law fully expounded by more competent writers to the *Mining Journal*, with calmness, clearness, and impartial dignity; and should a like success follow my humble efforts in calling the attention of our mining interests to this subject I shall feel well rewarded.

The subject is national, therefore it is local; that which relates to the strength and majesty of the kingdom is every man's business. To do justice to all should be our business, and not to screen ourselves from payments at the cost of others. I have long felt that we have certain favoured interests in this country which ought not to be, such as the funded and unfunded property, railway shares and debentures, interests in other countries from investments, colonial securities, Indian bond debt, bank shares, insurance, British and foreign mines, gas and water companies, telegraph companies, trucks on hire on railways, boats on hire on canals, docks, &c. In these investments alone will be found at least a rateable yearly value equal to 1500,000,000*l.*, which pays no share of local taxation, poor rates, &c., and a great portion totally free from rates and taxes of every description.

A short time ago the attention of our great men was called to a statement published in Doubleday's Financial History of England, when 170 years ago the whole revenue of our country only amounted to 2,001,855*l.*, and the whole cost of our poor only 166,821*l.*, paid out of that sum; and now, says our friend, we have to pay for about 70,000,000*l.* of imperial taxes, and when we add to that our poor rates and other local taxes and tithes, the poor free people of England have to pay more than 100,000,000*l.* a-year in taxes. "Yes," says our parliamentary friend, "and if I should live to be a very old man, I shall see our poor country paying 100,000,000*l.* in imperial taxes alone."

The tendency of taxation of late has been to take it in a more direct form; and we are told that the turnpikes are to be removed, and a rate in common is to be made on all property to cover that expense and the keeping the road in good repair, &c. And, as far as I see, it will be just to do so in a purely agricultural district, where every man keeps horses, carts, &c., in proportion to the number of acres he cultivates. But how does this work in other districts? Mrs. Brown lives in a manufacturing district; she pays 100*l.* per annum for her house, but having a large family to provide for and educate, is not able to keep a horse. She never rides, nor any of her children; in short, they have nothing to ride or drive; but she must pay as great a road tax as her next-door neighbour, who lives in a house at 100*l.* a-year, and keeps two horses to ride and two to drive, and has sometimes half-a-dozen. Gross injustice is stamped on the face of such a law, and cannot be endured. It is no doubt right to abolish toll gates, and introduce a cheaper form, which will do away with the gates and bars. Put a road duty on every horse of 5*l.* per annum, 10*l.* for every carriage and cart; form a trust, like the trustees now existing over the turnpike roads, and let all this sum be paid at the office of the trust four times a year; and let the trust have power, subject to the consent of the Board of Trade, from time to time to raise or lower such charges, according to the requirements of each district.

I have long been of opinion that all taxes on property for the poor should be paid by the landlord, as it is now paid, on small cottages. The landlord should be bound to pay such taxes twice a-year at the office appointed, and thus save the cost of collecting. If the cost of collecting tolls on turnpike roads must be saved, let the same rule apply to all other taxes.

Our funded property pays but one tax—the income tax—and it it may be that some of it does not pay that. What a shame it is that 1500,000,000*l.* should stand free of taxation, while the holders of other property are taxed to the last farthing. In the first place, every banker, the directors of every company and every agent paying dividends on foreign enterprise, funds, loans, &c., should be bound to pay over the property or income tax to a receiver. The Government to declare one uniform poor rate, which shall cover in every county the rates for police, magistrates, clerks, highways, bridges, &c., in the kingdom; and whatever the percentage may be on all such income, the same to be paid by the receiver at the time the dividend is handed over to its owner.

Poor rates on our home mines I consider I have included in the statement where I proposed that the landlord who receives rent shall pay all taxes and rates out of the rents received by him. Those who know anything of the working of mines and quarries must know that thousands have paid rent for them, and while they have been so doing they have lost every shilling invested in the undertakings. Nothing can be more unjust than to allow the man who receives a sure profit every year to go free of payments, while the man whose whole property is risked with a hope of making a living (in which he is too frequently ruined) is taxed to the highest degree.

Our taxes are not justly levied, and hence it is that the industrious working classes of this heavily taxed country have just cause to complain. The lords of the soil make the laws, and too frequently screen themselves from all payments, by throwing them on their less able tenants, and hence it is they do not care to look after local affairs, because they do not affect them.

One uniform poor rate throughout the country, making the same to fall upon the landlords, and not the tenants, and making it payable on all rent and income from every source, is what the nation demands, and must eventually have. P.

MINING AND PATENT LAWS—ENGLAND AND GERMANY.

Sir,—I find from your valuable Journal that a great deal has been said and written lately on patent law legislation, but I fear there are great numbers of people in England who talk much, and also write, on this subject who are not aware that the Prussian laws are now extended to the whole of Germany, Alsace, and Loraine. Therefore, while English industry has to pay heavy license for using patents, fifty millions of our nearest neighbours, who are without question the shrewdest people in the world, can and do use the same patents without any charge whatever.

In order, therefore, to give English industry fair play to compete with our powerful continental neighbours patent laws ought undoubtedly to be abolished. At present a man from any part of the world who finds something new, or, in fact, sometimes only a little improvement, is sure to go or send to England and get a patent, and the consequence is that whoever uses that article in England has to pay license to the patentee, whereas in Prussia, and many other parts of the world, the same thing can be used without any license or tax whatever.

The mining laws of England ought also to be taken more seriously into consideration, for at present the capitalist and miner are entirely at the mercy of the lords of the soil, and often the dues and fees charged on mine adventures are much too high. In Prussia the dues are fixed by the mining laws of that country at 2 per cent. on the value of the minerals returned, and no lord can charge more; neither can any lord or parties keep mining ground idle if other parties will work it. An English Miner on the Continent.

Cologne, March 28.

ADVANTAGES OF MINING ENTERPRISE.

Sir,—Amongst the transformations which are at present taking place in nations, moral, political, and commercial, one very powerful agent is lost sight of in a great degree—Mining. I hesitate not to say that no material agencies are working greater changes in the world than the development of mining enterprise. Mr. Gladstone, in a speech at Furness, in Lancashire, did recognise this. He ventured to tell a Lancashire audience that cotton was no longer king, but that iron swayed the supreme sceptre. It would have been more correct to say that mining held the regal rod, for what would iron be without coal, or any of the metals without this mineral. It is true that iron is worked in the Prussian empire by charcoal, even where coal in abundance is beneath the feet of the workers. In Ireland, during a long period of time, iron was extensively wrought, and by means of charcoal, as it was not then known that coal, especially furnace coal, existed there. In Sussex excellent iron used to be produced; that from which the railings of St. Paul's Cathedral were made was Sussex, and it was not worked by coal, but by charcoal. But it is obvious enough that timber grows scarce in those countries where iron is produced. In the Ural the Russian Government timber is too scarce to use that commodity, and coal will be in future employed. The same is the case in Pennsylvania and some other places, so that this mineral is brought more rapidly into use; and, although our coal fields are not exhaustless, the coal fields of the world are practically so, by all calculations which can now be put forth in the computation, and generally where there is coal there iron is also found, Providence having brought them together, so that their alliance may be feasible and facile.

The development of the mineral and the metal is going on rapidly in most lands, from Labuan, in the Great Eastern Archipelago, to Western America, and wherever they are brought forth mighty change passes over the surface of the land and of society, which receives modification from the new energy imparted by the enterprise, and the actual wealth to which it necessarily conduces.

But only with that particular metal, the most useful of all metals, and with that mineral, the most useful of all minerals, but every metalliferous region becomes rapidly an emporium of wealth, and a seat of power. What would Australia be even yet had it not been for the gold discoveries there? By the latest advices we learn that the yield of gold in various directions, especially about Ararat, Ballarat, and Geelong, increases, and copper is also increasing. In New Zealand similar reports announce this element of growing greatness. California was a mere desert until the gold discoveries there. Colorado Nevada, and New Mexico are all rising quickly in population, wealth, and influence through the presence of mines, especially silver.

What a change has been effected in the appearance of Cardiganshire, in South Wales, through the silver-lead mines now worked there. It is not many years since Aberystwith was a village of huts rather than a town. It is now one of the most rising towns in the northern portion of South Wales.

Turning attention, again, to remote countries, what a start of life and animation is given to the Cape Colony, at the Cape of Good Hope, or rather series of colonies, the Cape Natal, Algoa Bay, Somerset, the Orange River, the "free state," the State of Marahakatza, are all on the *qui vive* of earnest excitement concerning the newly found gold fields. Some are of opinion that the region is the very Ophir of Solomon, whence the ships of Tyre and Sidon brought gold for the Temple. At all events, crowds of immigrants are now seeking the diggings, and towns are projected where the wild beasts roamed not long ago undisturbed.

The discovery of diamonds in Australia and the Cape of Good Hope must give an extraordinary impetus to both regions, for diamonds of all sorts, especially brilliants, were very scarce, and growing scarcer, while the demand was rapidly expanding, Paris and New York being, perhaps, the chief consumers, or at least users, of those decorative treasures. Mr. J. Tenaant, F.G.S., mineralogist to the Queen, and professor of mineralogy in Queen's College, has lately published a pamphlet on this subject, in which the diamondiferous tract Jager's fontein is graphically described, with the routes thither from Cape Town, Graham's Town, Port Elizabeth, Natal, &c. The work will repay perusal, and assist in convincing men that one of the grandest sources of treasure to a country is its mines.

At the Royal Geographical Society Dr. Mann read a paper "On Mr. Baine's Explorations in the Gold Fields of South Africa," which not a little startled his audience, for it went to show that the grand hope of progress in the colonies is mining discovery. Nothing else will so soon people a region or bring commerce to its shore; it literally makes a new country to "bloom and blossom as the rose."

In a recent pamphlet, entitled "Queensland the Progressive," a country now inhabited by a few colonists from the mother country, is proved to be teeming with mineral riches, and no doubt speedily there also a mighty dominion will spring up, for through such discoveries "a nation is born in a day."

India has never been adequately explored for mineralogical purposes. Recently, however, some practical mining engineers have traversed large areas of the Himalayas, and report them as teeming with metals. Of the truth of this no doubt can be entertained, and neither can there be a shadow of dubiety as to the effect upon the material and social condition of India when capital is applied to bring forth the metals. Neither the cotton fields of Bombay nor the indigo plantations of Bengal will be comparable in value to these mines, and the latter will exercise a far superior moral influence.

Cornwall is an example of what we contend for here. It was the earliest civilised portion of England, perhaps of the British Isles, and this was through its metalliferous treasures. Jews, Phœnecians, and Britons chaffered on the landing place of Marazion for tin, when the Prophet Ezekiel was proclaiming his visions, and foretelling the latter days of the world. The Cornish had vehicles for drawing by horses the tin to the coast and other purposes, when the Gauls knew of no better mode than to load a horse's back with the burden, a mode, of course, tardy and expensive.

And even now Cornwall is a benefactor to the empire, the only portion of which, as far as yet discovered, where tin exists; and, as most tin mines are also copper mines, wealth is contributed both ways.

Probably that there is not an equal area on the face of the earth so richly stored with metals and minerals as Cornwall. About 40 mines in Cornwall have paid dividends during the last seven months, and there are now there many progressive mines of proved riches. Probably not half the metal-bearing country in Cornwall is yet worked. Trevarrack is one of those progressive mines well worth the attention of the investor; Rose and Chiverton United is another. It is believed by impartial and competent judges that it will yet be a property which will rival East Wheal Rose and East Caradon. Information is available at the office of the company, which will confirm these remarks.—*Bishopsgate, London, April* 5. JOHN B. REYNOLDS.

THE VAN MINE, AND ITS SHARES.

SIR,—Two or three letters have lately appeared in the Journal advocating the sub-division of these shares into something smaller than 4*l.* 5s. each. What would "A Shareholder" like to see the nominal value reduced to? Perhaps sub-divided by ten, making the shares of 10s. each, with 8s. 6d. paid, leaving 1s. 6d. available for future requirements. Such would make the company represented by 150,000 shares, and a capital of 75,000*l.*, of which 63,750*l.* would be paid; and dividing the present market value of the shares (say 58*l.*) in the same ratio, the 10s. shares would then stand relatively in the market at 5*l.* 16s. per share. I hardly fancy that this rich company would like to encumber its register with so large a number of shares, with the resulting difficulty of enumeration to compile the list for each half-yearly meeting, and then to send this massive list annually—with the distinctive numbers of the shares held by each member, as well as the changes which may have taken place during the preceding year—to the office of the Registrar of Joint-Stock Companies.

The directors of this company can well manage its affairs, but in reference to these letters I may, nevertheless, be permitted to make a suggestion whereby, in my opinion, facilities of adhesion with the company might, with mutual advantage, be afforded to the public. To this end I should be inclined to adopt the provisions of the 25th and 26th Vic., cap. 89, and convert the paid-up shares of the company into stock, and pass a special resolution that no person shall be entitled to hold less than 1*l.*, nor any fractional part of 1*l.*, of such stock.

The present value of the shares (4*l.* 5s. paid), so converted into 100*l.* capital-stock, would represent at the market value before mentioned (58*l.*) about 1365*l.* per 100*l.* capital, and under this arrangement the small investors—and their name would be "legion," for there are doubtless many who would like to ride in and be a part proprietor of such a Van—could hold his 1*l.* capital stock by the investment of 13*l.* 10s. I think that no reasonable objection can be raised to the adoption of this suggestion; it is a power sought by most other public companies, and the Stock Exchange Daily List sufficiently evidences this with respect to railways. Why not, therefore, apply it to sound and legitimate mining companies? Its adoption would, in my opinion, tend to give confidence, for although the Companies Acts and the clauses of limitation are now tolerably well known, yet in many minds there exists a fear that some imaginary liability is attachable to shareholders, more particularly in mining companies, even after the shares are paid up. The fact of the conversion of shares into stock should carry conviction to the minds of all that absolute freedom from liability attends the holders of stock, and it would thus give still greater confidence in this gigantic and most successful undertaking. In office routine, too, its adoption would be an immense saving of time, as the checking of distinctive numbers where many transfers are made is a work requiring the greatest care; besides, no return of distinctive numbers would, in this case, be needed at the office of joint-stock companies. A MINE PROPRIETOR.

PEN'ALLT MINING COMPANY.

SIR,—At the request of the directors, I attended a private meeting at the offices of the company, on Thursday last, as did several other shareholders largely interested therein. We found these facts—1. That through the mismanagement, or want of judgment, of the directors, four of whom are professional engineers, machinery had been erected which was not suitable to dress the ore clean for market, and this machinery had cost upwards of 3000*l.*—2. That the whole of the capital had been spent.—3. That Prof. Forbes had been called in to report upon the mine, also Capt. John Kitto, whose great practical experience in the mines of North and South Wales, and also in the Isle of Man, entitles his opinion to be received with every confidence.

Regarding the first point there can only be one opinion—that the directors, knowing nothing of mining or mining machinery, too hastily proceeded to erect stone-breaker, crushers, &c., capable of dressing, stated (in their opinion) at as much as 40 to 60 tons of stuff per day, before ascertaining whether 40 tons could be supplied—in fact, before opening out the mine. The second point is easily accounted for in the shape of preliminary expenses and useless expenditure in machinery. The third point is full of importance, inasmuch as Prof. Forbes condemned the mine, the machinery, and everything; whilst Capt. Kitto, equally blaming the folly of such a large outlary on machinery before it was required, stated that the mine had not yet been proved, the lodes having been seen only comparatively at surface. The meeting thereupon resolved that two gentlemen—Mr. Dixon, a director, and Mr. Bond, a large holder—should go to the mine and ascertain every particular, in order to lay before the shareholders at the half-yearly meeting, on Wednesday next. What their opinion may be we have yet to learn, but there is one thing which the shareholders will, doubtless, remember—that all the reports of the present agent, and that of many other disinterested captains who have inspected the property, culminate in recommending the driving of a deep adit further east, where if the lode is intersected in a more compact and settled form than at present, and which may be reasonably expected, the proprietors of Pen'Allt will possess one of the richest properties in North Wales. The mine, as a mine, has not yet been a quarter proved, but the ore got out from the lodes already seen and treated has been rich for lead and silver. The quantity of ore, however, at the mine, the result of the dressing, is so small that the agent will be called upon to explain the wonderful discrepancy between his opinions and estimates and *actual* results. In conclusion, I would urge my co-shareholders to attend the general meeting, and insist upon a change of directors and management, as the property shows every indication of becoming rich if properly and economically developed.

The Van Mine, now the richest in Wales, was condemned some time ago, thus showing the absurdity of even *practical* men giving their opinion of ground unworked, although in a mineralised formation and country. The great Cumberland mines, near Alston, were turned from positive poverty and abandonment to fortune by one stroke of the pick, and from which very large dividends are now being received by the proprietors. The shareholders of Pen'Allt should, therefore, take every means to open up the mine, when I have every confidence in their being fully rewarded for their outlay.—P.S. The work done at the mine at present is really at surface only.—*London, April* 6. A SHAREHOLDER.

ANGLO-BRAZILIAN AND ROSSA GRANDE GOLD MINES.

SIR,—I have read with some interest the letter in the Supplement to the Journal of March 25, signed "Wheel within Wheel," and I think the time has now arrived with respect to the Anglo-Brazilian and Rossa Grande Mines that all shareholders who have it in their power to attend the coming annual meetings should not fail to do so, and if possible elicit something from the directors of such a nature as to justify the payment of the call recently made in Anglo-Brazilian of 4s. per share. I have been a large shareholder in these mines (as well as others under the same direction) for some years, and I have, along with the directors, placed implicit faith in Capt. Treloar's skill and judgment, but such faith is now very much weakened, and not without cause. When I see how Capt. Treloar has most signally failed in his predictions, they have been big with promise, but have brought forth nothing but disappointment, I do think it would be well to consider the advisability of responding to the call now made in Anglo-Brazilian shares for the purpose of purchasing another mining property to work in conjunction with the same, for should it result in a miserable failure, like the Gongo Soco with the Rossa Grande, it would be like throwing bank notes into the fire.

In reviewing past reports of the Anglo-Brazilian Mine we have frequently been told that the drawback to its success was want of force, consequent on the war. Such reason now does not exist; and, secondly, that the great riches of the mine would not be opened out until the Fundao section had been communicated with the old workings. Now, as it appears from the last returns published that such is on the eve of being accomplished, I think it would be better to see the result of Capt. Treloar's judgment in this apparently only remaining chance of the mine working to a profit before the shareholders commit themselves to further liability, for as "Wheel within Wheel" observes, seeing that the selling value of the share capital of these companies is absolutely less than the amount of a single call, is it just or reasonable to go on making calls when this is the case?

A HOLDER IN THE TWO COMPANIES OF 850 SHARES.

[For remainder of Original Correspondence see to-day's Journal.]

AMERICAN MINING NEWS.—The following items are extracted from the *Scientific Press* (San Francisco):—

COLORADO—THIRTY THOUSAND DOLLARS TO THE TON.—In the Caribou Mine, in the lower level on the south crevice, 111 feet west of the main shaft, a remarkably rich pocket of ore has been opened. It consists of probably the purest silver glance ever mined in this country, and assays enormously. An average specimen assayed $28,056·70 per ton, while the purest assays $32,764·20, in coin. Such a rich body of ore can only exist in a pocket, but at present it shows nearly 18 in. in width. Its length and depth are not yet ascertained.—A single cord of Sentinel bug ore, run in Kimber's stamp mill, yielded 28 ozs. 13 dwts., of which the currency value is $525. The Gunnell Company's property has been leased, and operations will be commenced in a few days.—The amount of gold sent East by the three banks of Central for this week will reach $24,000—a remarkable product for the third week of the month, which is always a dull one for the gold trade.

WASHOE.—The Chollar Potosi Mine is looking exceedingly well in every part. The amount of ore extracted during the week was 1700 tons, of which 1422 tons were forwarded to the mills. The average assay value has been $65·22 per ton, making the yield for the week $97,436. One bar weighed 1600 ozs., and was worth $3091·81, or $5·60 per ounce.

REESE RIVER.—The bullion shipped by the Manhattan Company, through Wells, Fargo, and Co., during February was 88 bars, of the value of $88,781·42; total amount shipped from this city during February, 118 bars of bullion, weighing 10,026 lbs., and of the aggregate value of $101,801·61: 34 of the bars were the product of the Canfields Mill, at Belmont, ten from Montezuma, and the balance from the Manhattan Mill.

NEVADA COUNTY.—John Landis and James Black, owners of the Goshen Hill claims, have just completed a sluice tunnel 1100 feet long, after 13 months' steady work, and have an excellent 3-feet flume through the tunnel 1260 feet long. They have 5000 feet of 11-inch hydraulic-pipe, with a fall of 200 feet, leading their water to a Craig's patent monitor nozzle. They will commence washing on Monday. The expense of fitting up these claims has been $15,000.

ELY DISTRICT.—A silver bar is on exhibition at Pony Saloon, extracted from 4 tons of ore, valued at $17·06 gold and $565·18 silver. This ore is from the newly-discovered district near Highland. The claim is owned by Mitchell, Pearman, and others.

MINING IN CANADA.

The progress of mining and allied industries in Canada during the year 1870 has been characterised by an almost total absence of speculation. Taking the whole Dominion into consideration, a steady advance may be said to have been made. Where there has been a falling off, it has been attributable to other causes than any failure in the mines themselves. The production of copper in the Province of Quebec has somewhat diminished; but, on the other hand, there has been an increase in that of silver, iron, salt, and petroleum in Ontario, and of coal in Nova Scotia. The Geological Survey began last year a systematic collection of the mineral statistics of the Dominion, and the effort to obtain these data has been successful, and the results will soon be published. In the meantime the following particulars are condensed from the report of Prof. ROBERT BELL, of the Geological Survey of Canada, adverted to in the Journal of March 18.

COPPER.

ONTARIO.—In October, 1870, the price of this metal touched the lowest point recorded during the last 150 years. The cause of this has been due to the continuation of increased shipments from the west coast of South America (chiefly Chili and Bolivia), and also to the war between Germany and France. Messrs. John Taylor and Sons, of London, have carried on operations at the West Canada Mines (the old Bruce, Wellington, and Huron Copper Bay locations) to about the same extent as in 1869, employing about 300 men and boys. These mines are now developed to such an extent that there is said to be ore for three or four years ahead in the workings ready for stoping out. About 2000 tons of 22 per cent. ore was shipped during the year. The ores at this mine having always been dressed up to a high percentage for shipment to England, a good deal of copper was necessarily left in the tailings. These accumulations of many years are now to be treated by DeBoussey's wet process for the extraction of their copper. A stack 120 feet in height and five furnaces, with all the necessary appliances and buildings, have been erected at a cost, it is reported, of about $100,000. The reduction works are in charge of Mr. Ninis, and the process has been found to succeed elsewhere, and already, on a small scale, at this mine.

QUEBEC.—The Huntingdon Mining Company has been recently reorganised on a large scale, and is under contract to supply 1000 tons of ore a month for the next two years. Work at the mine itself has been somewhat interrupted during the year, but about 4500 tons of ore have been produced. Part of this has been shipped to Swansea, and part to Baltimore, U.S. The company propose adopting Henderson's wet process for reducing some of their ore at the mine, which is situated in the township of Bolton. The Hartford Mining and Smelting Company, whose works are a few miles west of Lennoxville, have raised about 3000 tons of ore, and have a large quantity on hand. The sulphur of the ore is first used in the manufacture of acid, and the copper afterwards extracted. The ore has been sent to sulphuric acid works at Quebec, London, Ontario, Boston, and Bridgeport, U.S. The Capel Mine, close to the last mentioned, has been worked during the whole year, with an average of 25 men. The ore is reduced to regulus, containing about 35 per cent. of copper, and shipped to Liverpool. This mine is now upwards of 300 ft. deep. The proprietors are erecting apparatus for treating ore by Messrs. Hunt and Douglas' wet process. The Harvey Hill Mine, in Leeds, Megantic, belonging to the English and Canadian Mining Company, have given employment to an average of 25 men during the year. The work done has been more with a view to the development of the mine than to immediate production. The quantity sold amounted to only 132 tons of rich ore, which was sent to England, but about 500 tons of a lower grade remain on hand. At the Ives Mine, in Bolton, little has been done besides keeping the water pumped out of the workings.

LEAD.

ONTARIO.—The Galway Lead Mine, behind Peterboro from some unknown cause, has not been worked during the year. The last workings, over 100 feet in depth, showed the vein to improve greatly in going down. The company are said to have several thousand dollars worth of galena on hand. Operations were suspended at the Frontinac Mine in July, owing to some disagreement among the proprietors. The main shaft had reached a depth of between 90 and 100 feet, with a greatly increased proportion of galena towards the bottom, the vein maintaining its general character, and a width of over 10 feet. The westward continuation of the lode has been opened in a new place, about a mile from the main shaft, where it was found to be still rich in galena, and to have a thickness of 10½ feet.

IRON.

ONTARIO.—The Cobourg, Peterboro, and Marmora Railway and Mining Company have continued to work their iron mines in Belmont with great vigour. They employ over 100 men in the mines, and have spent a large sum in improving their railway. The shipments of ore for 1870 are reported to amount to about 10,000 tons. About 20,000 tons were produced in 1869. The Chaffey Mine, near Newboro, has been worked to a considerable extent during the past summer, and 3150 tons of ore have been sent by barges to Kingston, and shipped thence to Cleveland, Ohio. The Matthew's Mine, close to the last, has also been worked under the superintendence of Mr. Fyfield, and 4570 tons of ore were sent off by the same route as that from the Chaffey Mine. About 50 tons of iron ore have been sent from Howe's lot in Belmont, but it is said that the distance which the ore requires to be hauled to Wezipord, on the Rideau Canal, 14 miles, will prevent this deposit from being worked at present. The ore at all the above localities is of the magnetic variety, but at the Cowan Mine, near Playfair's, Mills, 12 miles west of Perth, a deposit of rich hematite has been worked by Messrs. Cowan, Robinson, D. Torrance, and Co., and about 5000 tons of ore have been produced, of which about half has been shipped to Cleveland. This ore has been found to yield 60 per cent. of iron on the large scale. The extensive beds of iron ore on the east shore of Lake Superior, belonging to Mr. G. D. Fergusson, of Fergus, and others, remain unworked, but now that Canadian ores are coming so much into demand in the United States these deposits will doubtless soon receive attention.

QUEBEC.—The Hull Iron Mines, which had been closed for more than a year, were re-opened in August last, and about 3500 tons of 67 per cent. ore taken out before the end of the year. The property has been purchased by some of the parties who are interested in the Cobourg, Peterboro, and Marmora Railway and Mining Company, under the name of the For-ym Mining Company. The St. Francis River Ironworks have been continued vigorously under the efficient management of Mr. O. A. Richer. The ore reduced at these works is the variety known as amonite or bog-iron, which yields a very tough white metal, highly prized for the manufacture of car wheels, for which it is extensively used. About $20,000 worth of iron from the St. Francis forges was sold in Montreal during the year. In the neighbourhood of Three Rivers, Mr. A. Larue's new works, north of the old Radnor forges, are said to have produced a large amount of iron, but we have no particulars to note. The St. Maurice forges, belonging to Messrs. John McDougal and Sons, of Three Rivers, were partially suspended, owing to the removal of some of the works a new locality further back in the country. Bog-ore is the variety reduced at both of these forges. The original Moisie Iron Company is extinct, and the property having relapsed into the hands of Mr. W. M. Molson, a new company under the same name has been formed by a few parties in Montreal and Syracuse, N.Y., with a capital of $500,000.

GOLD.

ONTARIO.—In the Hastings region, speculation has entirely died out, and the little work done during the year has been solely with a view to the legitimate profits of actual mining. The principal operations have been at the Cook Mine on Lot 7 in the 9th Concession of Marmora, where a vein of arsenical pyrites of considerable regularity, and measuring 4 feet in thickness, has yielded an average of 9 or 10 dwts. of gold per ton. Visible gold is frequently met with in the mispickel of the present working, although none was seen at first, and the proprietors were encouraged to sink on the vein owing to Prof. Chapman's assays showing a notable proportion of the precious metal. In November last 57 ozs. 10 dwts. of melted gold were produced at one cleaning up from the crushing of 107¾ tons of ore. The whole produce of the year at this mine is said to have been 170 ozs. Towards the close of the year, operations are reported to have been resumed at the Phœnix Mine in Madoc, and the Barrie Mines, Elzevir.

QUEBEC.—In the Chaudiere region operations have been carried on only in the Seigniory of Bigaud-Vaudreuil, and there principally by the Canadian and North-West Land and Mining Company, on property obtained from the De Lery Company. Mr. Wm. P. Lockwood, the agent of the new company, has had 20 or 30 men employed in alluvial digging, but proposes soon to commence crushing quartz from some of the auriferous veins on the property, and has obtained the use of De Lery Company's mill for that purpose. Mr. Lockwood's workings and explorations appear to have demonstrated the important fact as pointed out by Mr. Selwyn, that the gold is not confined to the beds of the present streams, but belongs to a set of ancient water courses, which do not correspond with the existing ones, but are concealed by the drift, sometimes crossing and running under the banks of the existing rivers. This discovery will enable explorations to be carried on more intelligibly, and with much greater probability of success than formerly. There appears to be little doubt that the gold of this district has been derived from quartz veins in the immediate vicinity of the positions in which it is now found. The actual production in 1870 has been only some $15,000, against about $20,000 the previous year, but the yield is likely to be very much increased in future.*

SILVER.

ONTARIO.—Various accounts have recently been published in regard to the silver mine at Thunder Cape. The present writer visited the locality in the middle of last October, and has received accounts of the mine from Fort William up to the close of the year. The party sent by the new proprietors under the direction of Capt. F. B. Frue, formerly of the South Pewable Mines, landed on September 1, and in two weeks had completed a coffer-dam 82 feet long, to shut out the water of the lake, and commenced mining. This dam was built of timber from the United States and puddled with clay brought from the Detroit River. It was surrounded outside by a crib about 150 feet square filled with stone. The water was quickly removed from the coffer-dam by means of steam-pumps. On October 16 the mine consisted of an open cut about 40 feet in length along the outcrop of the vein, and only 7 feet deep in the middle, tapering to nothing at each end. Out of this 120 barrels of ore had been taken by Capt. Frue's men in addition to what had been obtained by the Montreal Company by working under water, and which yielded them upwards of $25,000. Several hundred weight of samples were deposited in Capt. Frue's office at Ryantown on Thunder Cape. Some of these consisted of lumps of solid are as large as a man's head, from which the native silver protruded so thickly as to lacerate the fingers in attempting to lift them. At the time of my visit, 56 men were employed, but only a few of them were miners. It was intended to increase the number if possible to 100 before the winter set in. Up to the beginning of November the new company had landed 180 barrels of ore at the Sault Ste. Marie, from which it was being sent to Newark, N. J., to be reduced. The average weight of the barrels was 562 lbs., but one lot was larger and heavier. A further quantity of ore was sent down by the regular boats after the above date, and also by a steamer, which was sent specially by the mining company, and which arrived at Thunder Cape on November 14. The bulk of ore shipped by the Montreal Company averaged a little over $2000 to the ton, or about $1 per pound, and it was expected that what was sent away by the new company would prove equally rich. The first 100 barrels smelted, however, yielded only half that proportion, or $1000 per ton, and the total amount realised at the beginning of December was about $80,000, but it was believed that the additional ore secured would bring the amount up to $130,000 early in January of the present year. Last autumn a vein which had been known for some time on the north shore of Thunder Bay, about 12 miles east of Current River, or opposite Mary's Island, was found to contain silver, and was soon afterwards bought by some Americans, represented by Capt. Beck, who has been working the mine during the winter, and is said to have obtained good results. The Thunder Bay Silver Mining Company ceased operations in January, 1870. The buildings at the mine were all destroyed at the time of the great fires in the summer, but the stamp-mill and other buildings at the mouth of Current River escaped. A shaft was sunk on a silver vein on McKellar's Island last winter by parties at Fort William, but was not continued during the summer from want of funds.

(To be continued).

* For gold product of Nova Scotia, see letters of "Acadiensis," and abstract of Commissioner's report for 1870, in the *Mining Journal* of March 11 and 25.

FOREIGN MINING AND METALLURGY.

The information which comes to hand from various points as to the Belgian coal trade leads to the belief that the state of affairs is becoming bad. The hopes which had been conceived as to a serious revival in affairs on the establishment of peace have been deceived, since civil war has succeeded to foreign war in France, and civil strife is, perhaps, even more disastrous to industry than a foreign conflict. Comparatively little business is passing in Belgium with France, and stocks are accumulating at the pits' mouths. A considerable number of trucks which had been intended to be sent abroad have been dispatched instead to Belgian establishments, but these are now full supplied, and the grave question presents itself—What will the Belgian coalowners do now that their principal outlet has failed them? There is a talk already in the Charleroi district of a reduction in the extraction, and of a partial or complete stoppage of various working centres having become necessary. At present prices have not felt the consequences of a scarcity of orders, but it is impossible that this should long be the case unless an improvement is established in affairs.

The state of the Belgian iron trade is somewhat better than that of the Belgian coal trade. Orders are still forthcoming for all descriptions of iron plates, pig, &c.; it is only for rails that there has been some falling off in the demand. The Belgian works are applying themselves to the production of steel; the Sclessin Company is adopting the Martin-Siemens process for the production of cast-steel. The Monceau-sur-Sambre Blast-Furnaces Company has fixed its second dividend for 1870 at 1*l.* per share.

A return just issued shows that metallurgical industry is not pursued with much success in Saxony from a pecuniary point of view. The coal trade of Saxony presents, however, better results. During 1869 the collieries of Saxony effected a production of 30,627,663 bushels of coal, of the value of 6,135,101 thalers. The lignite mines produced 7,467,042 bushels, of the value of 604,750 thalers, while the total value of the production of the metallurgical establishments during the year was only 2,058,229 thalers.

The unfortunate events which have occurred during the last few days at Paris have made their influence felt upon the Havre copper market; while a transaction was recorded a few days since at 68*l.* per ton, another lot of 12 tons has been recently sold at 67*l.* per ton. At Marseilles there is scarcely any change to note in copper. The German copper markets have been well maintained; the troubles of France have not sensibly modified the situation, which, upon the whole, has been improving. There is little to report as to the French tin markets. In Germany, also, there has been no material change in tin. In Holland the great event of the last few days has been the periodical public sale; the 80,791 blocks of Banca held by the Society of Commerce were all sold, at 73½ fls. to 75½ fls., the average being 75 fls. There is no change to report in the state of the Marseilles lead market. In Germany the state of the lead trade is considered satisfactory. At Rotterdam, Stolberg and Eschweiler have made 11 fls., and German lead of various marks 10¾ fls. There has not been much passing in zinc upon the German markets; Breslau and Hamburg have been extremely quiet.

The production of Silesia is stated to have considerably declined in 1870, as compared with 1869, as regards both calamines and zinc. In the course of last year several German establishments stopped their works, and extinguished their furnaces. In December alone three establishments of Upper Silesia suspended their operations, and have not resumed them. Fourteen other establishments also considerably reduced their production; some enterprises obtained rather better results last year, but the falling-off in other cases was far from being counterbalanced. The production of calamines also largely fell off last year as compared with 1869, and there was further a diminution in the quantity of zinc in the calamines made available for consumption.

FOREIGN MINES.

PACIFIC.—Messrs. J. Irving Courtenay, Fred. R. Bennett, Francis Cope, and Lieut.-Col. C. Napier Sturt, M.P., the directors, have issued the following report of their proceedings since the adjourned general meeting, held at the London Tavern on Jan. 30:—"Immediately on taking office we prepared to carry out the recommendations of the Committee of Investigation, contained in their report adopted at the before-mentioned general meeting. We have, therefore, recalled Capt. James Brown, and appointed Capt. Henry Prideaux as the underground agent at Lander Hill Mine, and have much pleasure in announcing that he has arrived at Austin, taken possession of the mine on behalf of the company, and commenced work. As Capt. Prideaux has already worked in the mine upwards of four years, we consider that in appointing him as underground agent we have sent out a competent miner, whose local knowledge of the property is likely to be of benefit in the future working. His reports will be regularly published on receipt. Besides the appointment of an underground agent we have this week sent out Mr. Henry Sewell, M.E., a gentleman of considerable experience in the mining and reduction of silver ores in Chili, Peru, and Mexico, who will act as superintendent, and take entire charge of the property of the company in Nevada. We shall call a meeting of the shareholders as soon as Mr. Sewell's reports are received."

FRONTINO AND BOLIVIA (Gold).—The directors have received their usual accounts from the mines, with advices under date Feb. 11, accompanied by a remittance of 483¾ ozs. of gold dust, the produce for the month ending Jan. 29. The account and produce for the month ending Jan. 30 shows a profit of 36*l.* 10s. Mr. Rouch (Jan. 25) reports that he had reached the Bolivia Mines, that he had found them in good condition, and that he was about to introduce various improvements in the working of them. Mr. Rouch has been requested to furnish a full report upon the mines and their prospects, and the directors hope that the advices to be received at the end of this month will be accompanied by this report, and that it will conclusively show that the mines are of the value they have been represented to be. It will be satisfactory to the shareholders to observe that although the remittance is 19¼ ozs. less than that of the last month (arising from the fact of the Christmas holidays occurring during this month) there is a profit of 36*l.* 10s., against a loss of 261*l.* 6s. 8d. for the last month.

UNITED MEXICAN.—Guanaxuato, Feb. 21: Mine of Jesus Maria y Jose: Our hacienda workmen are confined to throwing down a small quantity of ore from our reserves. The mine, however, is full of buscones, who are working with considerable spirit, and the sales have kept up, on Feb. 9, to $2437; on the 16th, to $2387; and on the 23d, to $2079. The accounts for January show a loss of $3940, but there are other items not yet brought into account which would lessen the amount.—Mine of Remedios: In the frente of San Cristobal, north of Remedios, we have discovered some ore in the month; thus far it looks well, being about 2 varas broad, though not of very good ley. The rest of the works of exploration are poor; but from the reserves we are throwing down about 600 cargas of ore a week, of fair ley. The sales have been lower, because more ore has been sent to the haciendas, and were, on Feb. 9, $767, and on the 16th $1106. The accounts for January show a profit of $1018, of which $694 belong to the company.—Feb. 27: The ore in the frente de San Cristobal, in Remedios, continues. The sales on Feb. 23 were $1430.—Feb. 21: New Concern, Adit of San Cayetano: The adit advanced in the Buenos Ayres ground, in the month of January, 8½ varas. We have had a good deal of work after the communication was made, in laying down the tramroad, cleaning up, &c., so that thus far we have not opened the cross-cut to the south, which I consider necessary for exploration, but I will have it commenced as soon as possible.—Mine of San Antonio de la Ovejera: The cross-cut from the shaft is now 51½ metres long, and as yet we have not cut the lode. However, the steeper it is the better pleased I am, because, in the first place, these upright lodes in the district of La Luz are more productive than the flatter veins; and in the second, they are covered better by our pertenencias (boundaries).—Feb. 27: The rock in San Antonio de la Ovejera, which had been very hard, suddenly changed on Feb. 25, and now looks like the ground which is found immediately above the lodes of La Luz district, so that I hope ere long to cut the vein.

[For remainder of Foreign Mines see to-day's Journal.]

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